

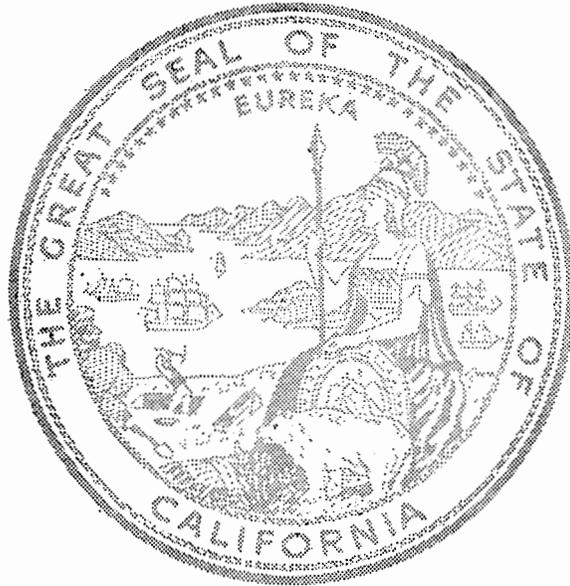
COMPILATION OF STRONG-MOTION RECORDS
RECOVERED FROM THE
SANTA BARBARA EARTHQUAKE
OF
13 AUGUST 1978

1978

CALIFORNIA DIVISION OF MINES AND GEOLOGY

PRELIMINARY REPORT 22





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PRELIMINARY REPORT 22

COMPILATION OF STRONG-MOTION RECORDS
RECOVERED FROM THE
SANTA BARBARA EARTHQUAKE
OF
13 AUGUST 1978

L. D. PORTER

OFFICE OF STRONG-MOTION STUDIES
CALIFORNIA DIVISION OF MINES AND GEOLOGY
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SACRAMENTO, CA 95816

with contributions from the
U. S. Geological Survey and the Southern California Edison Company

20 OCTOBER 1978

California Division of Mines and Geology
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Sacramento, CA 95814

DISCLAIMER

This preliminary data compilation has not been edited or reviewed for conformity with the standards and nomenclature of the Division of Mines and Geology. Although reasonable precautions have been taken to ensure the accuracy of the material presented, the preliminary nature of the data makes them all subject to change upon further verification. No measurements or scalings of the earthquake records should be attempted because of possible distortions in the photo copies.

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ACKNOWLEDGEMENTS

The California Division of Mines and Geology wishes to thank the individuals and organizations which supplied accelerograms from their instruments: K. L. Benuska (Kinematics, Inc.), D. K. Ostrom (Southern California Edison Company), and A. G. Brady (U. S. Geological Survey Seismic Engineering Branch). The author is particularly grateful to David J. Leeds for the references on site information.

ABBREVIATIONS

Organizations and Ordinances

CDMG	California Division of Mines and Geology
OSMS	Office of Strong Motion Studies (CDMG)
SCE	Southern California Edison Company
UBC ORD	Uniform Building Code Ordinance
USBR	U. S. Bureau of Reclamation
USGS	U. S. Geological Survey

Instruments

CRA-1	Central Recording Accelerograph (Kinematics, Inc.) [film]
FBA-N	Force-Balance Accelerometer (Kinematics, Inc.)
RFT-250	Triaxial accelerograph (Teledyne Corporation) [film]
SMA-1	Triaxial accelerograph (Kinematics, Inc.) [film]
SMA-2	Triaxial accelerograph (Kinematics, Inc.) [analog magnetic tape]

Accelerometer Axis Orientation

L, V; T	Longitudinal, Vertical; Transverse
	Freefield stations: Instrument axes
	Building stations: Building axes

Instrument Orientations

Direction	Case motion (not pendulum)
Stations not in structures	Orientation is in degrees azimuth (clockwise from north).
Stations in structures	Orientation is in quadrant notation.

State of California

Strong Motion Instrumentation Program

COMPILATION OF STRONG-MOTION RECORDS RECOVERED FROM THE SANTA BARBARA,

CALIFORNIA, EARTHQUAKE OF 13 AUGUST 1978

PRELIMINARY REPORT

INTRODUCTION

A moderate earthquake ($M_L = 5.1$, Caltech Seismological Laboratory) occurred 6 km south of Santa Barbara, California, on 13 August 1978. The earthquake had a focal depth of 12.5 ± 3 km and was located at lat $34^\circ 22.2'$ N and long $119^\circ 43.0'$ W (± 2 km) with an origin time of 22:54:52.4 (± 0.1 sec) (Lee, et al, 1978).

The Santa Barbara area is relatively densely instrumented: 23 accelerographs lie within 70 km of the epicenter (figs 1, 2). Within 50 km of the epicenter there are 13 stations, 10 of which are operated by the California Division of Mines and Geology. Of the eleven stations triggered by the earthquake (fig 3, table I), eight belong to the state program; the Southern California Edison Company, the U. S. Bureau of Reclamation and the U. S. Geological Survey each operate one of the remaining three stations.

PRESENTATION OF THE DATA

As an aid to the analysis of the records the stations are listed alphabetically (table I) and also in a north-south pattern (table II). The relative positions of the stations with respect to the epicenter are shown by the range and azimuth calculations (table III). The performance of the network of stations for the Santa Barbara region is examined with respect to increasing epicentral distance (table IV). The peak uncorrected ground accelerations (horizontal components) are listed along with their corresponding azimuths.

This last tabulation shows that peak values do not decrease uniformly with distance and that their corresponding azimuths have marked variations. The closest stations (6 km; Santa Barbara Court House, Freitas Building) to the epicenter recorded lower peak accelerations than the next closest at the University of California, Santa Barbara, North Hall and Goleta. In order to emphasize this effect which is apparently due to azimuth from the epicenter, the records have been compiled in the order of increasing epicentral distance. All of the accelerograms are full-scale copies of the original film or magnetic tape records. Photoreduced copies at two-thirds original scale are also included for those records which are longer than page size.

MEASUREMENTS FROM CENTRAL RECORDING SYSTEMS

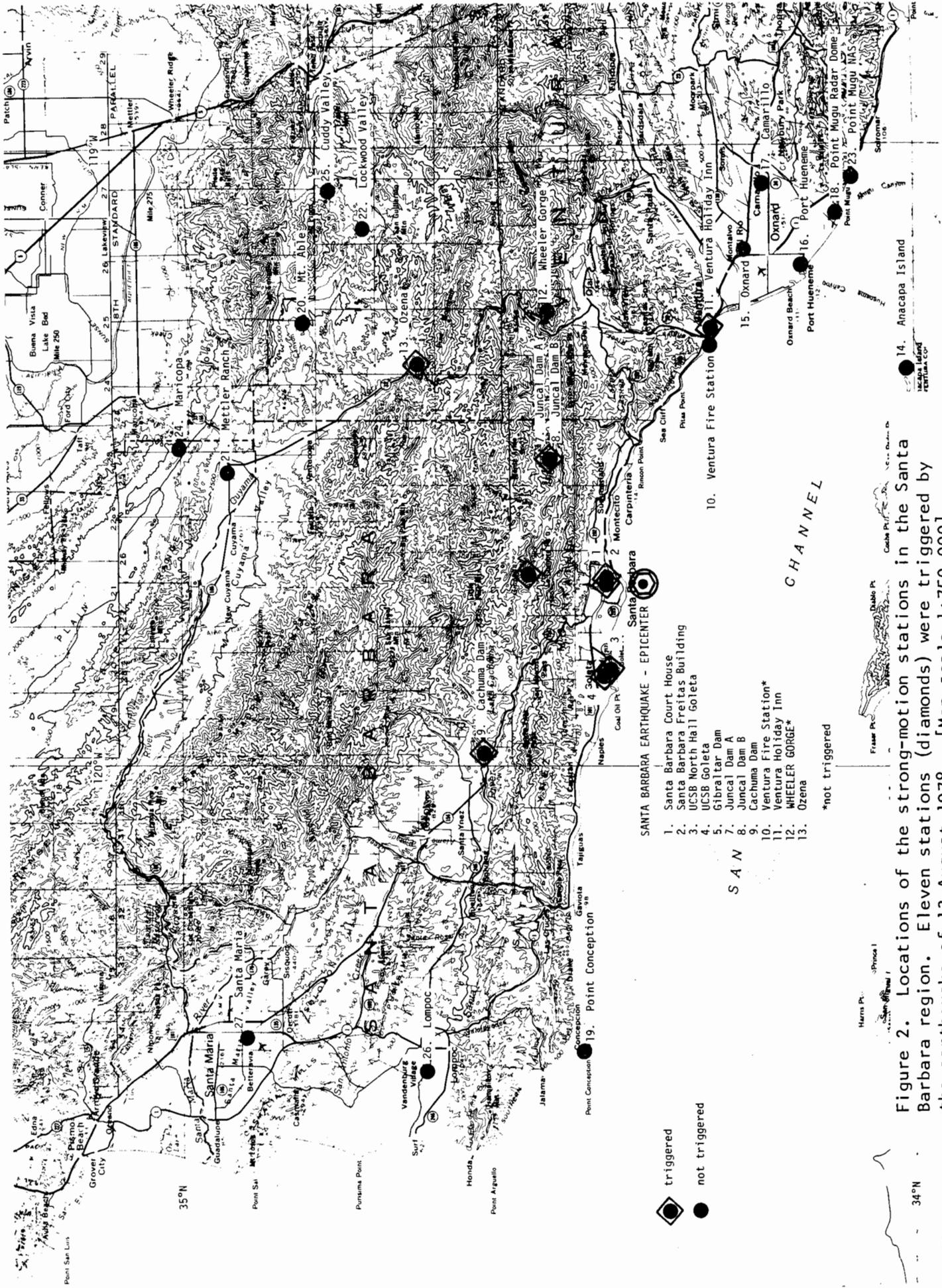
Three concrete shear-wall buildings with intensive instrumentation recorded the earthquake of 13 August. All had central recording systems with multiple remote sensors. The largest accelerations were obtained in North Hall (9 channels) at the University of California, Santa Barbara, with .44 g and .99 g in the north-south direction on the ground floor and third-story ceiling, respectively. The Freitas Building, Santa Barbara (9 channels) recorded .22 g in the basement and .67 g on the fourth-story ceiling. Both peaks were measured in the east-west direction, where as in the case of North Hall the peaks were in the north-south direction. The peak accelerations at the Holiday Inn, Ventura (15 channels), were .04 g on the ground floor and .08 g on the twelfth-story ceiling.

REFERENCES

Lee, W. H. K., Johnson, C. E., Henyey, T. L. and Yerkes, R. F., 1978, A preliminary study of the Santa Barbara earthquake of August 13, 1978 and its major aftershocks, manuscript submitted for publication, 24 p.



Figure 1. Outline Map of California showing the region of interest (black outline) for the Santa Barbara earthquake of 13 August 1978. [Scale 1:5,000,000 (approximate)].



- ◆ triggered
- not triggered

- SANTA BARBARA EARTHQUAKE - EPICENTER**
1. Santa Barbara Court House
 2. Santa Barbara Freitas Building
 3. UCSB North Hall Goleta
 4. UCSB Goleta
 5. Gibraltar Dam
 6. Juncaal Dam A
 7. Juncaal Dam B
 8. Cachuma Dam
 9. Cachuma Dam
 10. Ventura Fire Station*
 11. Ventura Holiday Inn
 12. WHEELER GORGE*
 13. Ozena
- *not triggered

Figure 2. Locations of the strong-motion stations in the Santa Barbara region. Eleven stations (diamonds) were triggered by the earthquake of 13 August 1978. [Map scale 1:750,000].

TABLE I

Alphabetical list of strong-motion stations for the Santa Barbara Region

	NUMBER		NAME	OWNER	DATA CHANNELS	REPORT PAGE(S)*
	CDMG	USGS				
1.	169	929	ANACAPA ISLAND	CDMG	3	
2.		106	CACHUMA DAM	USBR	6	35-36
3.	282	5120	CAMARILLO	CDMG	3	
4.	51	996	CUDDY VALLEY	CDMG	3	
5.	255	941	GIBRALTAR DAM	CDMG	12	24-26
6.			GOLETA SUBSTATION	SCE	3	27-28
7.	291	5135	JUNCAL DAM A	CDMG	9	29-31
8.	295	5135	JUNCAL DAM B	CDMG	9	32-34
9.	29	729	LOCKWOOD VALLEY	CDMG	3	
10.	154	940	LOMPOC	CDMG	3	
11.		1041	MARICOPA	USGS	3	
12.	52	997	METTLER RANCH	CDMG	3	
13.	84	995	MOUNT ABLE	CDMG	3	
14.		919	OXNARD	UBC ORD	9	
15.	164	953	OZENA	CDMG	3	43
16.		271	POINT CONCEPTION	SCE	3	
17.	148	923	POINT MUGU NAS LAGUNA PEAK	CDMG	3	
18.	147	774	POINT MUGU NAS RADAR DOME	CDMG	3	
19.	281	272	PORT HUENEME	CDMG	3	
20.		283	SANTA BARBARA COURT HOUSE	USGS	3	10-11
21.	302	5137	SANTA BARBARA FREITAS BLDG.	CDMG	9	12-15
22.	91	885	SANTA BARBARA UCSB GOLETA	CDMG	3	21-23
23.	213	5093	SANTA BARBARA UCSB NORTH HALL	CDMG	9	16-20
24.	152	939	SANTA MARIA	CDMG	3	
25.	89	884	VENTURA FIRE STATION	CDMG	3	
26.	339	5156	VENTURA HOLIDAY INN	CDMG	15	37-42
27.	90	883	WHEELER GORGE	CDMG	3	

*Stations without page numbers were not triggered by the Santa Barbara earthquake of 13 August 1978.

TABLE II

North-south list of strong-motion stations for the Santa Barbara region

N	STATION		NAME	LATITUDE	LONGITUDE
	USGS	CDMG			
1	1041		MARICOPA	35.00	119.48
2	997	52	METTLER RANCH	34.94	119.52
3	939	152	SANTA MARIA	34.92	120.44
4	995	14	MT. ABLE	34.83	119.28
5	556	51	CUDDY VALLEY	34.80	119.07
6	729	29	LOCKWOOD VALLEY	34.75	119.13
7	953	164	OZENA	34.68	119.35
8	540	154	LDMPOC	34.67	120.50
9	106		CACHUMA DAM	34.58	119.98
10	941	255	GIBRALTAR DAM	34.53	119.69
11	883	90	WHEELER GORGE	34.51	119.27
12	5135	291	JUNCAL DAM A	34.49	119.51
13	5135	295	JUNCAL DAM B	34.49	119.51
14	000	000	GOLETA SUBSTATION (SCE)	34.47	119.89
15	271		POINT CONCEPTION	34.46	120.41
16	885	91	SANTA BARBARA UCSB GOLETA	34.42	119.86
17	5137	302	SANTA BARBARA FREITAS BLDG	34.42	119.70
18	283		SANTA BARBARA COURT HOUSE	34.42	119.70
19	5093	213	SANTA BARBARA UCSB NORTH HALL	34.41	119.85
20	5156	339	VENTURA HOLIDAY INN	34.28	119.29
21	884	89	VENTURA FIRE STATION	34.28	119.30
22	919		OXNARD	34.23	119.17
23	5120	282	CAMARILLO	34.21	119.08
24	272	281	PORT HUENEME	34.15	119.20
25	774	147	POINT MUGU RADAR DOME	34.11	119.11
26	923	148	POINT MUGU NAS	34.07	119.05
27	929	169	ANACAPA ISLAND	34.02	119.36

TABLE III

Range and azimuth calculations for strong-motion stations in the Santa Barbara region
(arranged in the order of increasing epicentral distance)

NO.	NAME	STATION USGS CDMG	LOCATION		EPICENTRAL DISTANCE (DEG)	SURFACE RANGE (KM)	AZIMUTH	
			LATITUDE (DEG)	LONGITUDE (DEG)			(1)-(2) (DEG)	(2)-(1) (DEG)
	SANTA BARBARA EARTHQUAKE - MAIN EVENT	13 8 1978						
1	SANTA BARBARA CCURT FHOUSE	283	34.37	-119.72	.05	5.84	18.34	198.35
2	SANTA BARBARA FREITAS BLDG	5137 302	34.42	-119.70	.05	5.84	18.34	198.35
3	SANTA BARBARA UCSE NORTH HALL	5093 213	34.41	-119.85	.11	12.75	290.40	110.33
4	SANTA BARBARA UCSB GCLETA	885 91	34.42	-119.86	.13	14.02	293.35	113.27
5	GIBALTAR CAM	941 255	34.53	-119.69	.16	17.96	8.82	188.84
6	GCLETA SUBSTATION (SCE)	000 000	34.47	-119.89	.17	19.17	305.42	125.32
7	JUNCAL DAM A	5135 291	34.49	-119.51	.21	23.45	55.35	235.47
8	JUNCAL DAM B	5135 295	34.49	-119.51	.21	23.45	55.35	235.47
9	CACHUMA DAM	106	34.58	-119.98	.30	33.37	314.36	134.21
10	VENTURA FIRE STATION	884 89	34.28	-119.30	.36	39.92	104.36	284.60
11	VENTURA HOLICAY INN	5156 339	34.28	-119.29	.37	40.82	104.04	284.28
12	WHEELER GERGE	883 90	34.51	-119.27	.40	44.18	69.29	249.55
13	CZENA	953 164	34.68	-119.35	.43	48.34	44.55	224.75
14	ANACAPA ISLAND	929 169	34.02	-119.36	.46	51.07	139.38	319.58
15	LXNARD	919	34.23	-119.17	.48	52.96	106.90	287.21
16	PURT HLENEHE	272 281	34.15	-119.20	.48	53.75	116.85	297.15
17	CAMARILLO	5120 282	34.21	-119.08	.55	61.54	106.58	286.94
18	POINT MUGU RACAR ECME	774 147	34.11	-119.11	.57	63.17	117.00	297.34
19	FCINT CCNCEPTION	271	34.46	-120.41	.58	64.22	279.14	98.75
20	MT. ABLE	955 84	34.83	-119.28	.59	65.06	38.22	218.47
21	METTLER RANCH	997 52	34.94	-119.52	.59	65.84	16.11	156.23
22	LCCKKCCD VALLEY	729 29	34.75	-119.13	.62	68.62	51.93	232.27
23	POINT MUGU NAS	923 148	34.07	-119.05	.63	70.14	118.14	298.51
24	MARICOPA	1041	35.00	-119.48	.66	73.27	17.40	197.54
25	CUDDY VALLEY	996 51	34.80	-119.07	.69	76.37	51.16	231.53
26	LCMPCC	940 154	34.67	-120.50	.71	78.98	295.14	114.70
27	SANTA MARIA	939 152	34.92	-120.44	.81	89.89	312.95	132.54

TABLE IV

Network-performance matrix-Santa Barbara earthquake of 13 August 1978
(stations arranged in the order of increasing epicentral distance)

Station	Epicentral distance (KM)	Data Channels		Time Code Receiver		Peak Ground Motion Accel'n / Orient'n (g) (deg) (g) (deg)	Report Page(s)
		Operational	Useable	Operational	Legible		
1. Santa Barbara Court House	6	3	3			.21 042 .10 312	10-11
2. Santa Barbara Freitas Bldg.	6	9	9			.22 090 .11 000	12-15
3. Santa Barbara UCSB N. Hall	13	9	9			.27 090 .44 000	16-20
4. Santa Barbara UCSB Goleta	14	3	3			.39 270 .24 180	21-23
5. Gibraltar Dam	18	12	9	Yes	Yes	.20 310 .09 040	24-26
6. Goleta Substation	19	3	3			.24 090 .28 000	27-28
7. Junca1 Dam A	23	9	9	Yes	Yes	.08 050 .03 140	29-31
8. Junca1 Dam B	23	9	9	Yes	Yes	.04 060 .08 150	32-34
9. Cachuma Dam	33	6	6			.12 250 .08 340	35-36
10. Ventura Fire Station	40	6	6				
11. Ventura Holiday Inn	41	15	15			.03 090 .01 000	37-42
12. Wheeler Gorge	44	3	3				
13. Ozena	48	3	3	(3)		*	43
14. Anacapa Island	51	3	3				
15. Oxnard	53	9	9				
16. Port Hueneme	54	3	3				
17. Camarillo	62	3	3				
18. Point Mugu Radar Dome	63	3	3				
19. Point Conception	64	3	3				
20. Mt. Able	65	3	3				
21. Mettler Ranch	66	3	3				
22. Lockwood Valley	69	3	3				
23. Point Mugu NAS	70	3	3				
24. Maricopa	73	3	3				
25. Cuddy Valley	76	3	3				
26. Lompoc	80	3	3				
27. Santa Maria	90	3	3				

* no recognizable waveform

CALIFORNIA STRONG MOTION INSTRUMENTATION PROGRAM

STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4+ 0.1
 Region Santa Barbara

Latitude 34.37 N (+ 2 km)
 Longitude 119.72 W (+ 2 km) Depth (km) 12.5 + 3 km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 5.8 Azimuth (E)-(S) (deg) 18
 (deg) .05 (S)-(E) (deg) 198

Station Number CDMG none USGS 283 Owner U. S. Geological Survey
 Name Santa Barbara Court House
 Address Court House County Santa Barbara

Latitude 34.42 Type
 Longitude 119.70 Structure Size 2 story building
 Installed 0-0-1933 Class
 Removed in place

Instrument Type(s) RFT-250 Location/Type Basement
 Serial Number(s) CT-201
 Installed 25 August 1976 Removed in place

Record Installed n/a By Recovered n/a By
 CDMG File No.

Trace (from top)	Component	Orientation (deg)	Sensitivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual. Serv. Rec.
.1	L	042	1.96	.047	.59		.21		
.2	V	UP	1.92	.048	.59		.07		
.3	T	312	1.95	.047	.61		.10		

Site information:

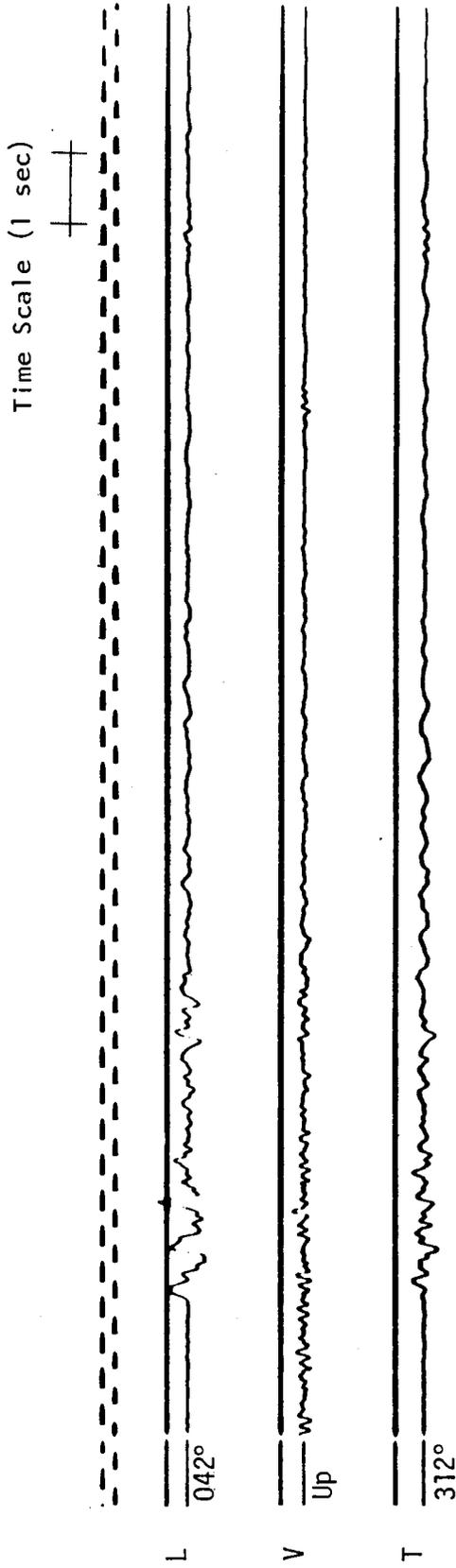
Duke, C. M. and D. J. Leeds, 1962, Site characteristics of southern California strong-motion earthquake stations: Department of Engineering, University of California, Los Angeles Report 62-55; reprinted 1972, California Division of Mines and Geology Special Publication 38, 112 p.
 Matthiesen, R. B. et al, 1964, ibid, Part II: Department of Engineering, University of California, Los Angeles Report 64-15, 185 p.
 Geotechnical and strong motion earthquake data from U. S. accelerograph stations: Shannon and Wilson, Inc., and Agabian Associates, 1978, U. S. Nuclear Regulatory Commission Report NUREG-0029, v. 2, NRC-6A.

Time Code Quality Times: Trigger S-Wave Arrival
 S-Wave-Trigger 1.85 sec

Record Evaluated By Date of This Sheet

Remarks: U. S. Geological Survey accelerogram supplied by Gerry Brady, USGS Seismic Engineering Branch, Menlo Park, California.

Santa Barbara earthquake 13 August 1978
USGS Station 283 Santa Barbara Courthouse
RFT-250 Serial No. CT-201



U. S. Geological Survey accelerogram supplied by Gerry Brady, USGS
Seismic Engineering Branch, Menlo Park, California.

Santa Barbara Earthquake 13 August 1978
 CDMG Station 302 Santa Barbara Freitas Building
 CRA-1 Serial No. 158

INSTRUMENTED BUILDING DESCRIPTION FORM

Building: Freitas Building
 (Name and 200 East Carrillo Street
 address) Santa Barbara, CA

Coordinates: 34.423⁰N , 119.698⁰W

Number of stories above/below ground: 4 / 1 (half basement)

Plan shape: Rectangular

Base dimensions: 137'6" x 109'5"

Typical floor plan dimensions: Same

Vertical load carrying system: Steel decking with 2½" concrete topping;
 (include floor decking system) steel frame

Lateral force resisting system: isolated exterior r.c. shear walls
 (include element locations)

Foundation type: Spread footings with uplift drilled belled caissons
under shear-walls

Unusual architectural features: None

Design date: 1968

Construction date: 1970

Design engineer: Stanley Mendes
 (Name and 1226½ State Street
 address) Santa Barbara, CA

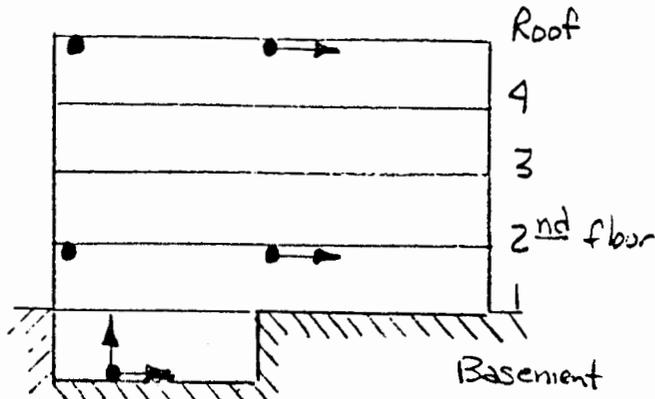
Architect: Edwards-Pitman
 (Name and 120 E. De La Guerra Street
 address) Santa Barbara, CA

Owner: Joseph Freitas & Son
 (Name and Agent: Beaver & Free
 address) 200 E. Carrillo Street
Santa Barbara, CA

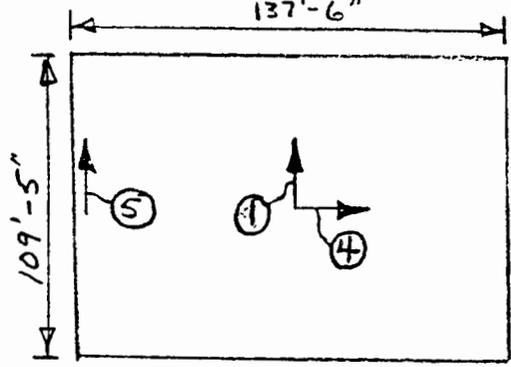
Remarks: _____

STRONG-MOTION INSTRUMENTATION SCHEME

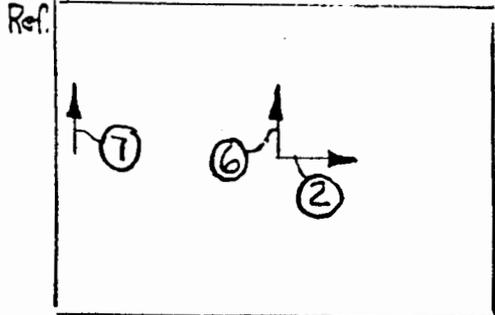
Freitas Building, 200 East Cabrillo Street, Santa Barbara, California



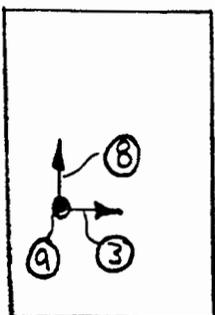
E-W Section



Roof Plan



2nd Floor Plan



Basement Plan

Installation Notes:

Horizontal accelerometers at roof and 2nd floor levels are to be attached to the underside of slab or beam

Accelerometers 3, 8 & 9 are to be attached to the topside of the basement floor slab in the telephone room.

Vertical starter is to be located in the basement; horizontal starter is to be attached to the roof level.

The recorder is to be located in the basement.

Recorder trace order:

- Accelerometer 1
- Fixed trace -
- Accelerometer 2
- ditto 3
- Fixed trace -
- Accelerometer 4
- ditto 5
- Fixed trace -
- Accelerometer 6
- ditto 7
- Fixed trace -
- Accelerometer 8
- ditto 9
- Fixed trace -

CALIFORNIA STRONG MOTION INSTRUMENTATION PROGRAM

STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4 \pm 0.1
 Region Santa Barbara

Latitude 34.37 N \pm 2 km
 Longitude 119.72 W \pm 2 km Depth (km) 12.5 \pm 3 km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 5.8 Azimuth (E)-(S) (deg) 18
 (deg) .05 (S)-(E) (deg) 198

Station Number CDMG 302 USGS 5137 Owner CDMG
 Name Santa Barbara - Freitas Building
 Address 200 East Carillo Street County Santa Barbara

Latitude 34.423 Type Building
 Longitude 119.698 Structure Size
 Installed 18 March 1977 Class
 Removed in place

Instrument Type(s) CRA-1, FBA-1, FBA-1, FBA-3, FBA-1, FBA-1, FBA-1, FBA-1, FBA-3, FBA-3
 Serial Number(s) 158, 9643, 9644, 9661, 9628, 9631, 9632, 9642, 9663, 9662
 Installed 18 March 1977 Removed in place

Record Installed 18 April 1978 By MacGrady Recovered 14 Aug. 1978 By Mac Grady
 CDMG File No.

Trace (from top)	Compo- nent	Orien- tation/ floor/loc.	Sensi- tivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual. Serv Rec.
.9643								11.80	
.1	T	N/roof/core	17.5	.01953	.64	5	.28		
.9644									
.2	L	E/2nd/core	16.8	.01915	.65	5	.28		
.9661									
.3	L	E/bsmt/W end	17.4	.01972	.64	4	.22		
.9628									
.4	L	E/roof/core	17.6	.01980	.63	12	.67		
.9631									
.5	T	N/roof/W end	17.9	.02057	.61	4	.22		
.9632									
.6	T	N/2nd/core	17.7	.01996	.63	2	.11		
.9642									
.7	T	N/2nd/W end	17.8	.01915	.65	3	.17		
.9663									
.8	T	N/bsmt/W end	17.4	.01960	.62	2	.11		
.9662									
.9	V	UP/bsmt/W end	17.5	.01988	.63	1	.06		

Time Code none Times: Trigger S-Wave Arrival
 S-Wave-Trigger = 1.1 sec

Record Evaluated By Date of This Sheet

Remarks:

(1) N/Roof/Core

(2) E/2nd/Core

(3) E/Bsmt/W end

(4) E/Roof/Core

(5) N/Roof/W end

(6) N/2nd/Core

(7) N/2nd/W end

(8) N/Bsmt/W end

(9) UP/Bsmt/W end

Time Scale (1 sec)

INSTRUMENTED BUILDING DESCRIPTION FORM

Building: North Hall
 (Name and University of California - Santa Barbara
 address) Goleta, CA

Coordinates: 34.41°N, 119.85°W

Number of stories above/below ground: 3 / 0

Plan shape: Rectangular

Base dimensions: 240'-0" x 34'-0"

Typical floor plan dimensions: Same as base dimensions

Vertical load carrying system: 2½" rc slab supported by rc joists spanning
 (include floor decking system) between rc floor beams running in transverse
direction; floor beams supported by 14"x10" rc
interior columns & rc and masonry-block
exterior columns

Lateral force resisting system: After strengthening operation: rc shear-walls
 (include element locations) in both directions throughout

Foundation type: Caissons under exterior columns; 12" x 18" tie beams;
4" rc slab

Unusual architectural features: None

Design date: 1960

Construction date: 1975 (reconstruction)

Design engineer: Kenneth S. Iwata & Assoc.
 (Name and Civil and Structural Engineers
 address) 8277 Beverly Blvd.
Los Angeles, CA

Architect: Douglas Honnold & John Rex
 (Name and Architects and Assoc.
 address) 9026 Melrose Ave.
Los Angeles, CA

Owner: Ray Baird Architect
 (Name and University of California - Santa Barbara
 address) Goleta, CA
(805) 961-2853

Remarks: Building originally designed to 1/10th code seismic force.
Structure strengthened in 1975. Forced vibration tests
performed by G. C. Hart (UCLA) before and after strength-
ening operation

STRONG-MOTION INSTRUMENTATION SCHEME

North Hall, University of California, Santa Barbara

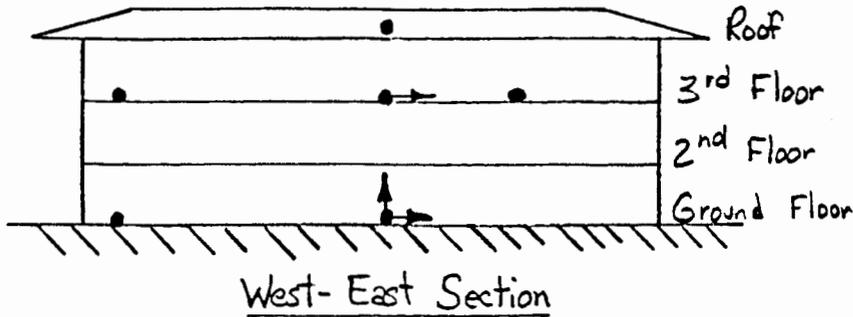
Installation Notes:

Accelerometers 1 through 6, 8 & 9 are attached to the topside of the floor slab.

Accelerometer 7 is attached to the underside of the roof beam.

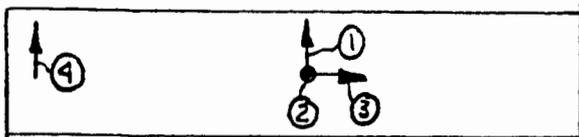
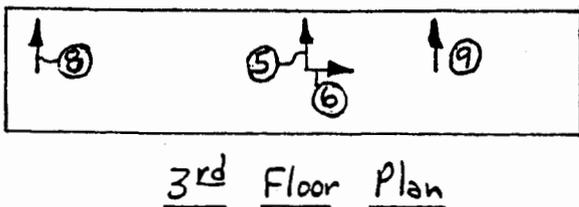
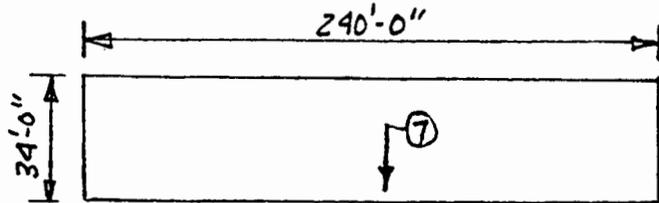
Horizontal starter is adjacent to accelerometer 6.

Vertical starter and recorder are adjacent to accelerometers 1, 2, and 3.



Recorder trace order:

- Accelerometer 1
- Fixed trace -
- Accelerometer 2
- ditto 3
- Fixed trace -
- Accelerometer 4
- ditto 5
- Fixed trace -
- Accelerometer 6
- ditto 7
- Fixed trace -
- Accelerometer 8
- ditto 9
- Fixed trace -



CALIFORNIA STRONG MOTION INSTRUMENTATION PROGRAM

STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4 ± 0.1
 Region Santa Barbara

Latitude 34.37 N + 2 km
 Longitude 119.72 W + 2 km Depth (km) 12.5 + 3 km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 12.8 Azimuth (E)-(S) (deg) 290
 (deg) .11 (S)-(E) (deg) 110

Station Number CDMG 213 USGS 5093 Owner CDMG
 Name Santa Barbara - Univ. of California - North Hall
 Address UCSB Campus, Goleta County Santa Barbara

Latitude 34.415 Type Building
 Longitude 119.846 Structure Size
 Installed 7 November 1975 Class
 Removed in place

Instrument Type(s) CRA-1, FBA-3, FBA-3, FBA-3, FBA-1, FBA-1, FBA-1, FBA-1, FBA-1, FBA-1
 Serial Number(s) 115, 7644, 7643, 7641, 7630, 7633, 7657, 7722, 7725, 7727
 Installed 7 November 1975 Removed in place

Record Installed 3 Aug 1978 By MacGrady Recovered 14 Aug 1978 By MacGrady
 CDMG File No.

Trace (from top)	Compo- nent	Orien- tation floor/loc.	Sensi- tivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual.	Serv Rec.
.7644								35.50		
.1	T	N/grnd/core	18.2	.01886	.64	9	.44			
.7643										
.2	V	UP/grnd/core	17.8	.01923	.61	2	.11			
.7641										
.3	L	E/grnd/core	18.6	.01869	.61	5	.27			
.7630										
.4	T	N/grnd/W end	18.6	.01948	.67	7	.38			
.7630										
.5	T	N/3rd/core	18.7	.01897	.67	12	.64			
.7657										
.6	L	E/3rd/core	19.6	.01886	.66	11	.56			
.7722										
.7	-T	S/roof/core	18.1	.01834	.68	17	.99			
.7725										
.8	T	N/3rd/W end	18.7	.01814	.66	11	.59			
.7727										
.9	T	N/3rd/E end	18.3	.01851	.68	12	.66			

Time Code Quality Times: Trigger S-Wave Arrival
 S-Wave-Trigger = 3.1 sec

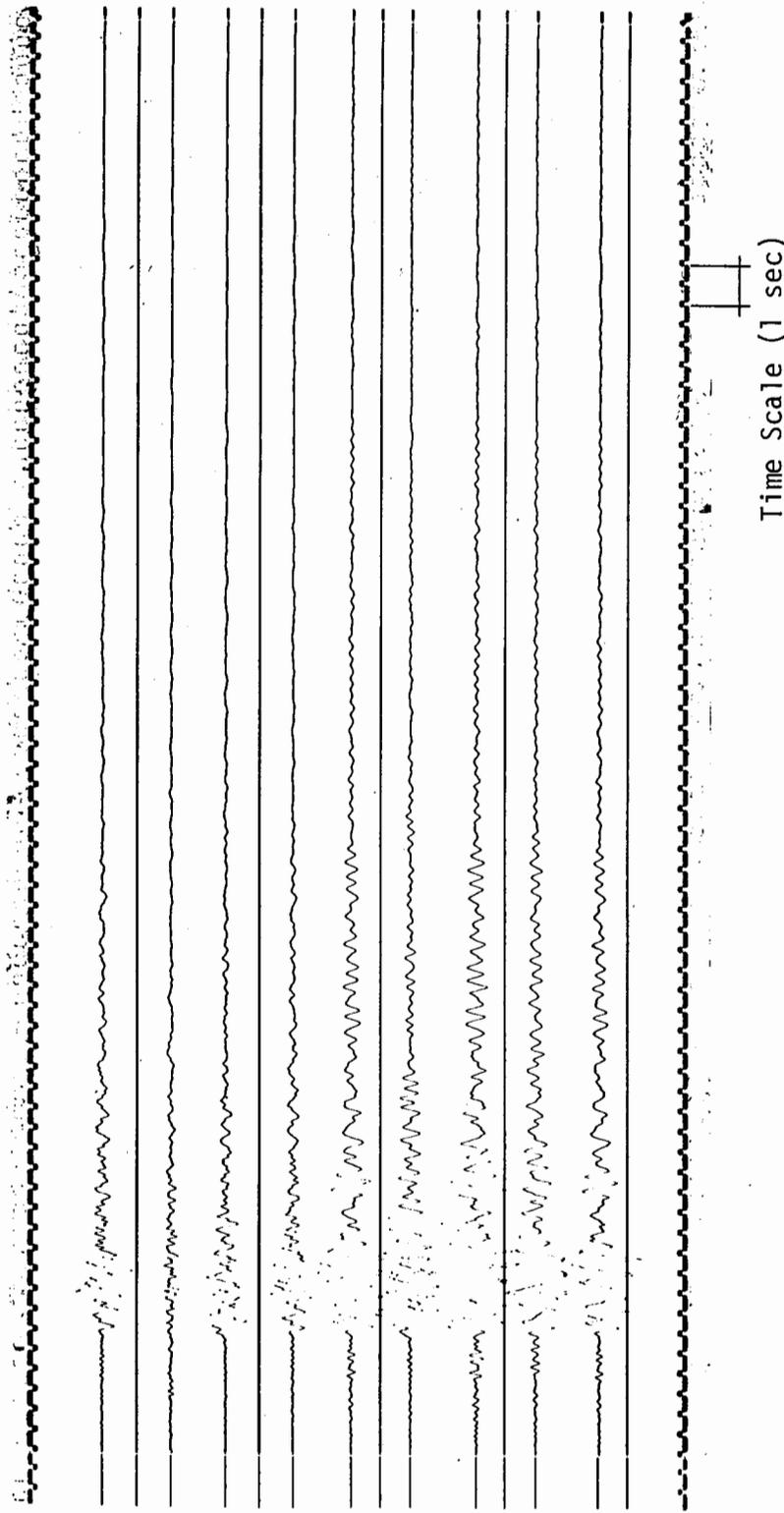
Record Evaluated By Date of This Sheet

Remarks:

Santa Barbara earthquake 13 August 1978

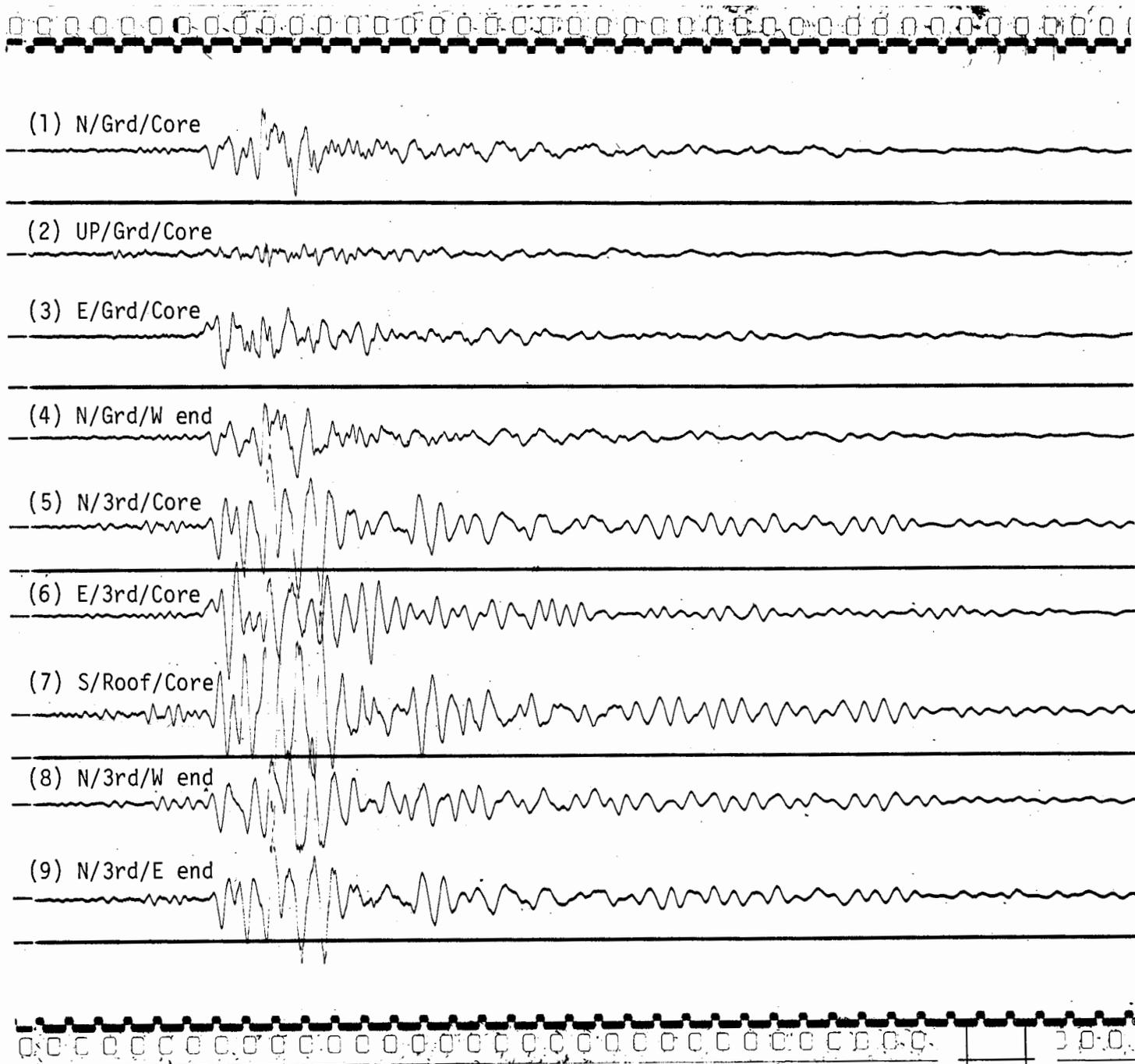
CDMG Station 213 Santa Barbara - Univ. of California - Goleta

CRA-1 Serial no. 115



Reduced copy [54% scale] of original accelerogram in its entirety.
See following page for full-scale section.

Santa Barbara earthquake 13 August 1978
CDMG Station 213 Santa Barbara UCSB North Hall
CRA-1 Serial No. 115



Time Scale (1 sec)

STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4 ± 0.1
 Region Santa Barbara

Latitude 34.37 N ± 2 km
 Longitude 119.72 W ± 2 km Depth (km) 12.5 ± 3km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 14 Azimuth (E)-(S) (deg) 293
 (deg) 0.13 (S)-(E) (deg) 113

Station Number CDMG 91 USGS 885 Owner CDMG
 Name Santa Barbara - Univ. of California - Goleta
 Address UCSB Physical Plant Dept. County Santa Barbara

Latitude 34.422 Type Freefield
 Longitude 119.851 Structure Size
 Installed 15 March 1974 Class
 Removed in place

Instrument Type(s) SMA-1
 Serial Number(s) 1607
 Installed 15 March 1974 Removed in place

Record Installed 11 April 1978 By MacGrady Recovered 14 Aug. 1978 By MacGrady
 CDMG File No.

Trace (from top)	Component	Orientation (deg)	Sensitivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual. Serv Rec.
1	L	270	18.1	.03846	.591	7	.39	29.0	
2	V	UP	18.4	.03891	.602	2.5	.14		
3	T	180	18.9	.03937	.552	5.5	.24		

Site information:

Hansen, W. R. et al, 1973, Geotechnical data compilation for selected strong-motion seismograph sites in California, Woodward-Lundgren and Associates, National Oceanic and Atmospheric Administration Report.

Time Code none Times: Trigger S-Wave Arrival
 S-Wave-Trigger = 3.3 sec

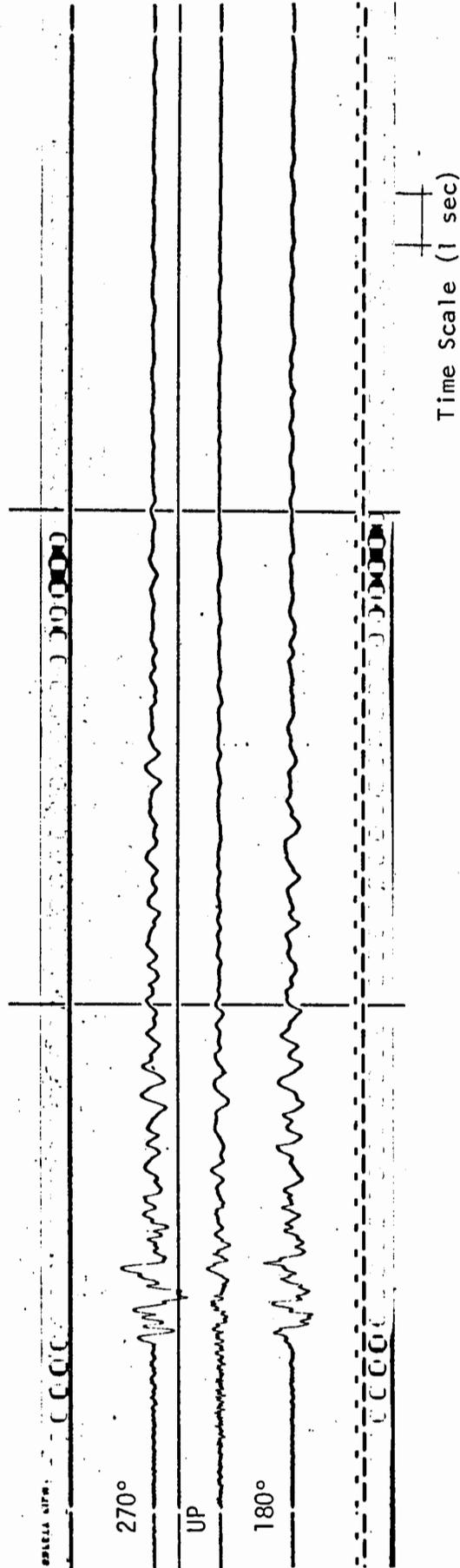
Record Evaluated By Date of This Sheet

Remarks:

Santa Barbara earthquake 13 August 1978

CDMG Station 91 Santa Barbara - Univ. of California - Goleta

SMA - 1 Serial No. 1606

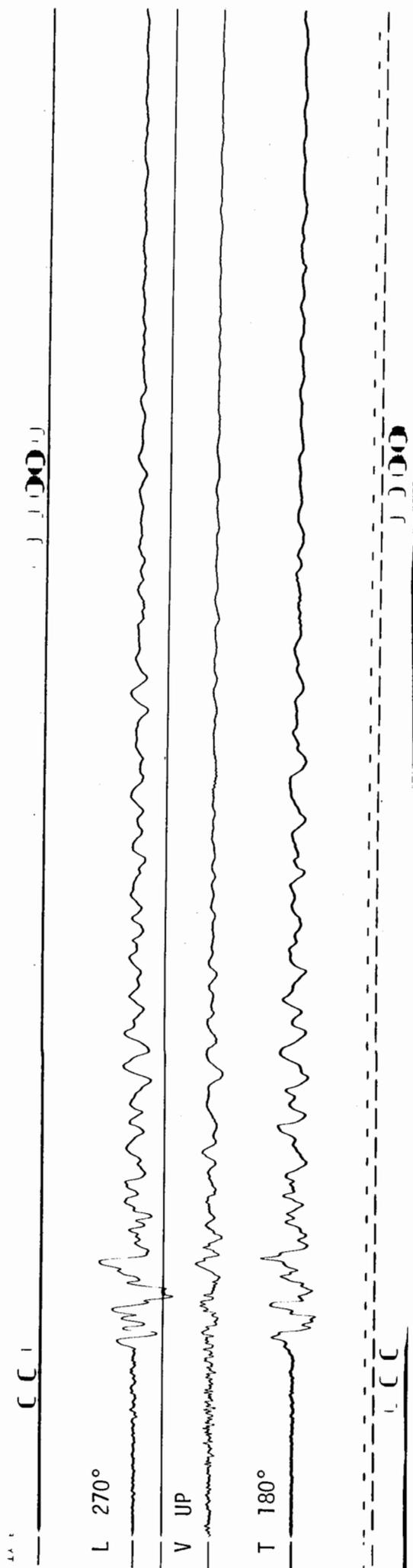


Reduced copy [two-thirds scale] of original accelerogram
See following page for full-scale version.

Santa Barbara earthquake 13 August 1978

CDMG Station 91 Santa Barbara - Univ. of California - Goleta

SMA-1 Serial No. 1606



CALIFORNIA STRONG MOTION INSTRUMENTATION PROGRAM

STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4+ 0.1
 Region Santa Barbara

Latitude 34.37 N (+ 2 km)
 Longitude 119.72 W (+ 2 km) Depth (km) 12.5 + 3 km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 17 Azimuth (E)-(S) (deg) 8
 (deg).16 (S)-(E) (deg) 188

Station Number CDMG 225 USGS 941 Owner CDMG
 Name Gibraltar Dam
 Address County Santa Barbara

Latitude 34.53° Type Lifeline
 Longitude 119.69° Structure Size
 Installed 10 July 1974 Class
 Removed in place

Instrument Type(s) SMA-T, RFT-250, RFT-250, RFT-250
 Serial Number(s) 2459, 375, 498, 487
 Installed 19 May 1976 Removed in place

Record Installed 20 April 1978 By MacGrady Recovered 17 Aug 1978 By MacGrady
 CDMG File No.

Trace (from top)	Compo- nent	Orien- tation (deg)	Sensi- tivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual. Serv Rec.
. 2459	right abutment								
. 1	L	217	16.8	.037	.555	0.75	.04	74.50	
. 2	V	UP	17.2	.037	.606	0.5	.03		
. 3	T	127	17.6	.039	.606	0.75	.04		
. 375	center crest								
. 1	L	305	19.7	.048	.59	out of service			
. 2	V	UP	18.9	.046	.59	out of service			
. 3	T	215	19.5	.047	.59	out of service			
. 498	left crest								
. 1	L	040	17.0	.046	.600	1.75	.09		
. 2	V	UP	18.1	.047	.627	illegible			
. 3	T	310	17.2	.047	.595	3.5	.20		
. 487	left abutment								
. 1	L	140	20.0	.048	.59	0.75	.04		
. 2	V	UP	18.9	.048	.59	0.5	.03		
. 3	T	050	19.5	.047	.59	0.5	.03		
.									
.									

Time Code Quality Times: Trigger S-Wave Arrival
 S-Wave-Trigger = 2.4 sec

Record Evaluated By Date of This Sheet

Remarks:

Santa Barbara earthquake 13 August 1978

CDMG Station 225 Gibraltar Dam

SMA -IT Serial No. 2459 Right Abutment



217°



UP



127°



RFT-250 Serial No. 375 Center Crest

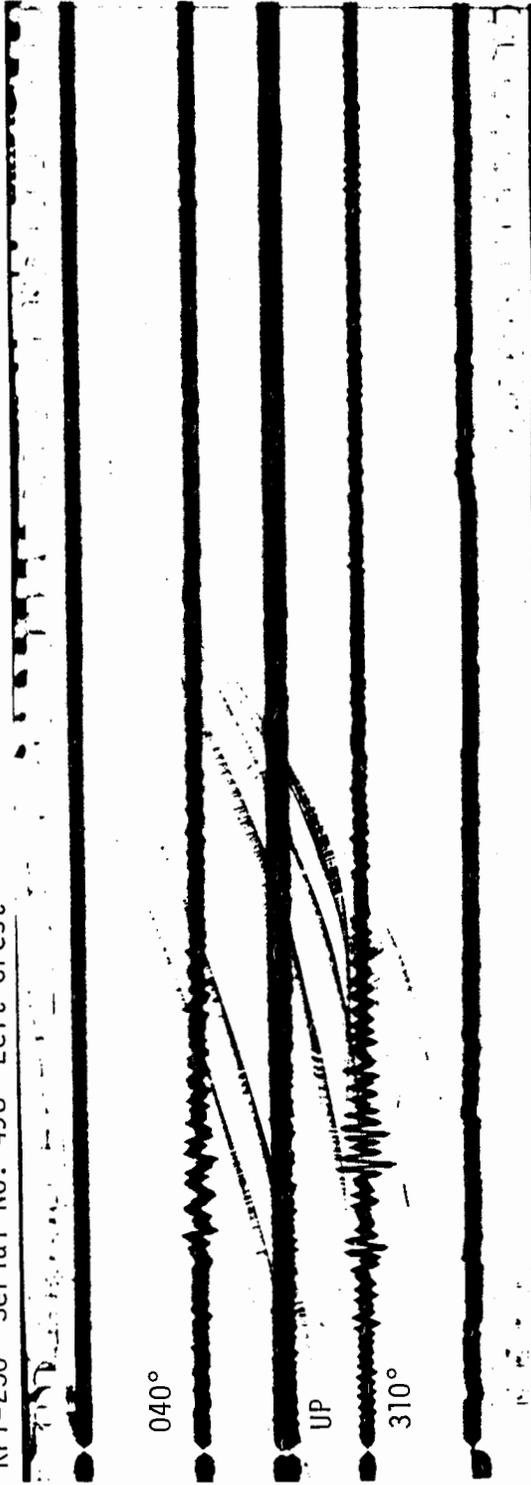
OUT OF SERVICE - ALL THREE CHANNELS

Time Scale (1 sec)

Santa Barbara earthquake 13 August 1978

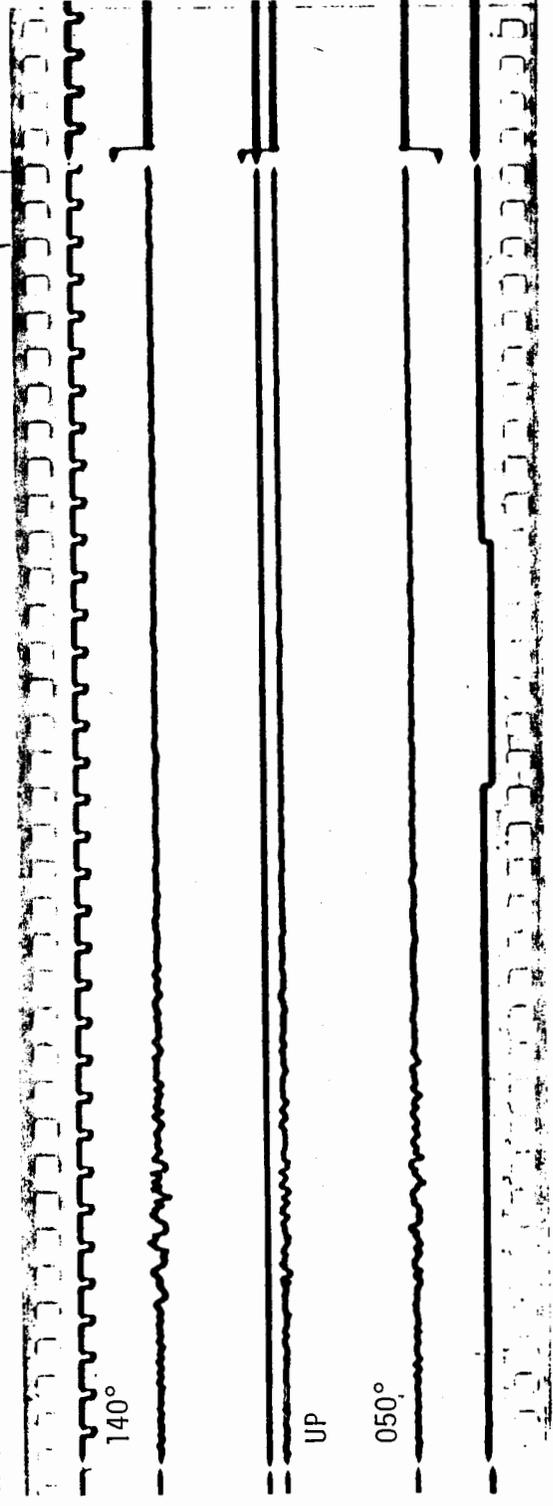
CDMG Station 225 Gibraltar Dam

RFT-250 Serial No. 498 Left Crest



Time Scale (1 sec)

RFT-250 Serial No. 487 Left Abutment



STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4 ± 0.1 GMT
 Region Santa Barbara

Latitude 34.37 N ± 2 km
 Longitude 119.72 W ± 2 km Depth (km) 12.5 ± 3
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 19 Azimuth (E)-(S) (deg) 305
 (deg) .17 (S)-(E) (deg) 125

Station Number CDMG none USGS none Owner Southern California Edison Company
 Name Goleta Substation
 Address Glen Annie Canyon County Santa Barbara

Latitude 34.47 N Type Freefield
 Longitude 119.89 W Structure Size
 Installed n/a Class
 Removed in place

Instrument Type(s) SMA-2
 Serial Number(s) 113
 Installed n/a Removed in place

Record Installed n/a By Recovered n/a By
 CDMG File No.

Track	Component	Orientation (deg)	Sensitivity (v/g)	Period (sec)	Crit. Damp.	Peak Ampl. (v)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual.	Serv Rec.
. 1	L	090	2.55	.040	.60	.6	.24			
. 2	T	000	2.68	.040	.60	.75	.28			
. 3	V	UP	2.32	.039	.60	.2	.09			

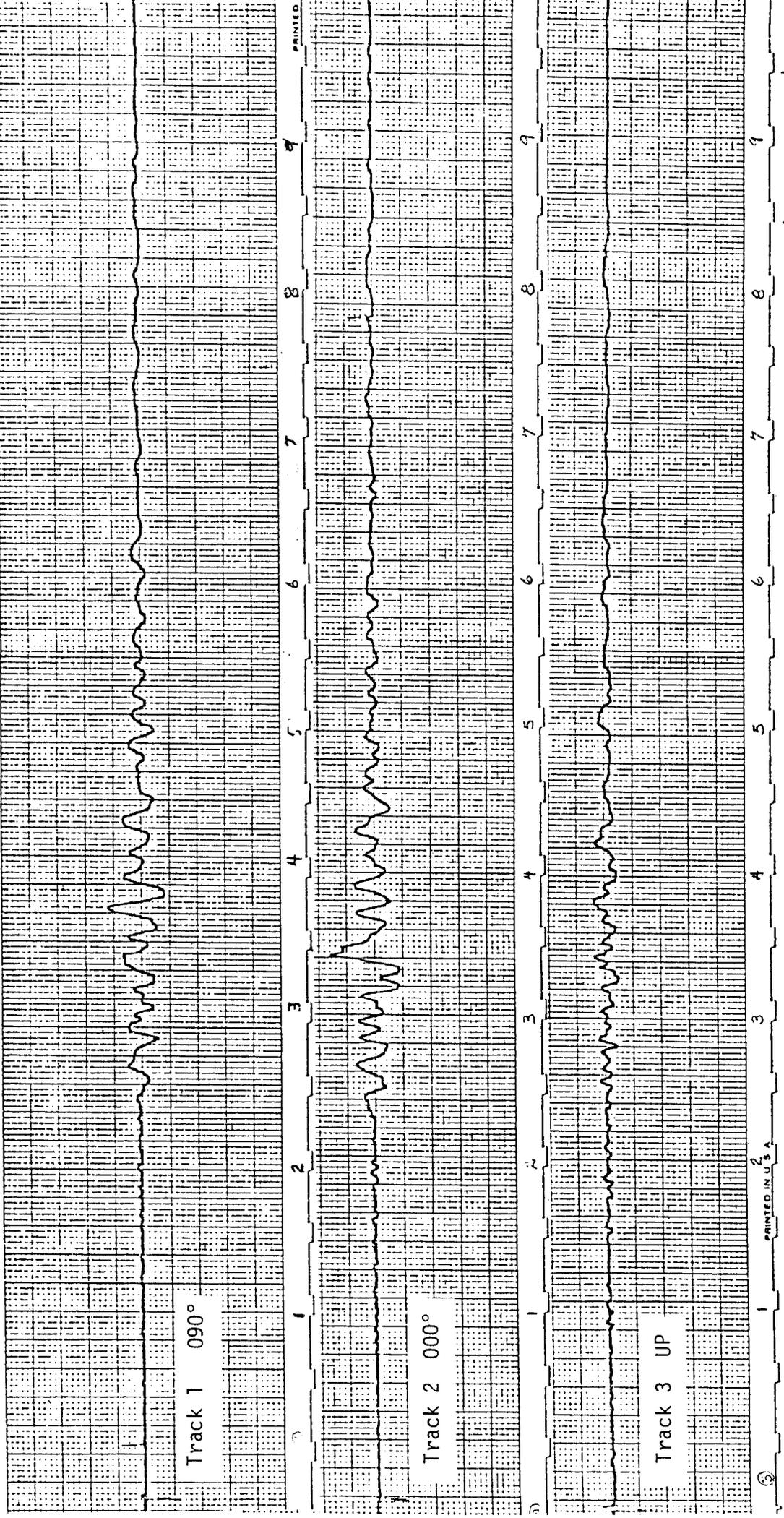
Reference information on the Southern California Edison Company seismic network:
 Ostrom, D. K. and R. S. Douglas, 1974, One company's seismic surveillance system, Bulletin of the Seismological Society of America, v. 64, no. 4, p. 1353-1359.

Time Code Quality Times: Trigger S-Wave Arrival
 S-Wave-Trigger = 2.5 sec

Record Evaluated By Date of This Sheet

Remarks: Southern California Edison Company accelerogram supplied by Lee Benuska, Kinematics, Inc., Pasadena, California.

Santa Barbara earthquake 13 August 1978
SCE Station (unnumbered) Goleta Substation
SMA-2 Serial No. 113



Southern California Edison Company accelerogram supplied by Lee Benuska,
Kinometrics, Inc., Pasadena, California.

STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4+ 0.1
 Region Santa Barbara

Latitude 34.37 N (+ 2 km)
 Longitude 119.72 W (+ 2 km) Depth (km) 12.5 + 3 km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 23 Azimuth (E)-(S) (deg) 55
 (deg).21 (S)-(E) (deg) 235

Station Number CDMG 291 USGS 5135 Owner CDMG
 Name Juncal Dam A
 Address County Santa Barbara

Latitude 34.491 Type Lifeline
 Longitude 119.506 Structure Size
 Installed 6 November 1976 Class
 Removed in place

Instrument Type(s) SMA-1T, SMA-1, SMA-1
 Serial Number(s) 2520, 1684, 1688
 Installed 6 November 1976 Removed in place

Record Installed 22 April 1978 By MacGrady Recovered 17 Aug 1978 By MacGrady
 CDMG File No.

Trace (from top)	Component	Orientation (deg)	Sensitivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual.	Serv Rec.
.2520	Top of hill between Arch-Dam and Spillway Section									
.1	L	160	18.7	.039	.559	<0.5	<.03	74.85		
.2	V	UP	17.9	.039	.581	<0.5	<.03			
.3	T	070	17.3	.039	.559	1.0	.06			
.1684	RT Crest of Spillway									
.1	L	140	18.1	.038	.569	<0.5	<.03			
.2	V	UP	17.9	.039	.571	<0.5	<.03			
.3	T	050	19.4	.040	.565	1.5	.08			
.1688	LT Crest of Spillway									
.1	L	175	17.9	.038	.565	<0.5	<.03			
.2	V	UP	17.8	.039	.563	<0.5	<.03			
.3	T	085	19.0	.039	.561	0.95	.05			
.										
.										
.										
.										
.										

Time Code Quality Times: Trigger S-Wave Arrival
 S-Wave-Trigger

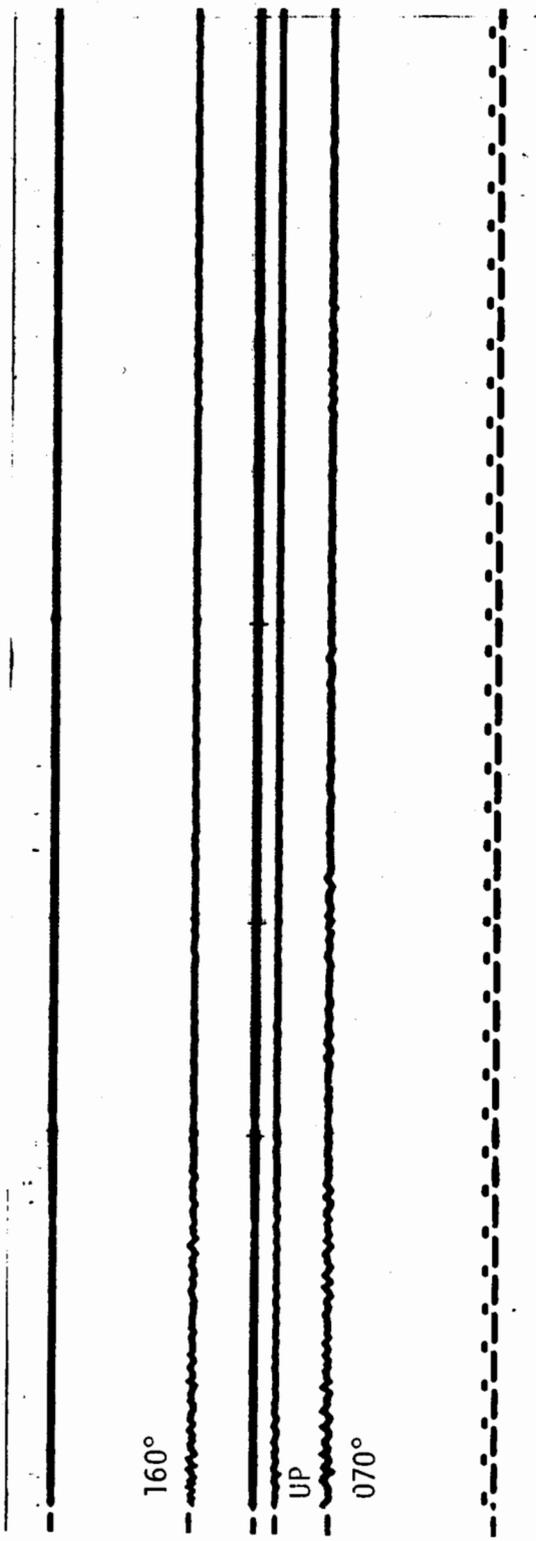
Record Evaluated By Date of This Sheet

Remarks:

Santa Barbara earthquake 13 August 1978

CDMG Station 291 Junca1 Dam A

SMA-1T Serial No. 2520 Hilltop between arch dam and spillway section



SMA-1 Serial No. 1684 Right Crest of Spillway

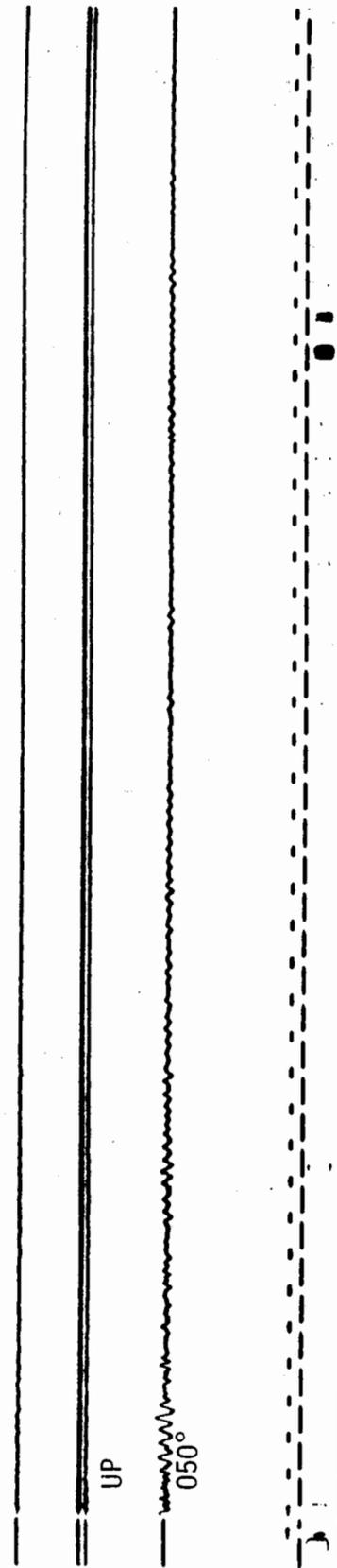
KODAK 12 4 1 2/3 11 1/2

Time Scale (1 sec)

140°

UP

050°



Santa Barbara earthquake 13 August 1978

CDMG Station 291 Junca1 Dam A

SMA-1 Serial No. 1688 Left Crest of Spillway



175°



UP



085°



Time Scale (1 sec)



CALIFORNIA STRONG MOTION INSTRUMENTATION PROGRAM

STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4 ± 0.1
 Region Santa Barbara

Latitude 34.37 N (+ 2 km)
 Longitude 119.72 W (+ 2 km) Depth (km) 12.5 ± 3 km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 23 Azimuth (E)-(S) (deg) 55
 (deg).21 (S)-(E) (deg) 235

Station Number CDMG 295 USGS 5135 Owner CDMG
 Name Juncal Dam B
 Address County Santa Barbara

Latitude 34.492 Type Lifeline
 Longitude 119.507 Structure Size
 Installed 6 November 1976 Class
 Removed in place

Instrument Type(s) SMA-1T, SMA-1, SMA-1
 Serial Number(s) 2521, 1705, 1719
 Installed 6 November 1976 Removed in place

Record Installed 22 April 1978 By MacGrady Recovered 17 Aug 1978 By MacGrady
 CDMG File No.

Trace (from top)	Compo- nent	Orien- tation (deg)	Sensi- tivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual. Serv Rec.
.2521	Center of arch								
.1	L	150	17.1	.037	.600	1.3	.08	72.70	
.2	V	UP	18.2	.038	.603	0.5	.03		
.3	T	060	18.3	.038	.562	0.75	.04		
.1705	Crest (Gravity Station)								
.1	L	170	19.3	.040	.559	1.5	.08		
.2	V	UP	17.6	.038	.559	< 0.5	< .03		
.3	T	080	19.3	.040	.583	< 0.5	< .03		
.1719	Right multi arch section								
.1	L	150	18.2	.038	.577	0.5	.03		
.2	V	UP	19.3	.040	.591	< 0.5	< .03		
.3	T	060	17.9	.039	.583	< 0.5	< .03		
.									
.									
.									
.									
.									

Time Code Quality legible Times: Trigger 22:55:02.6 GMT S-Wave Arrival S-Wave-Trigger

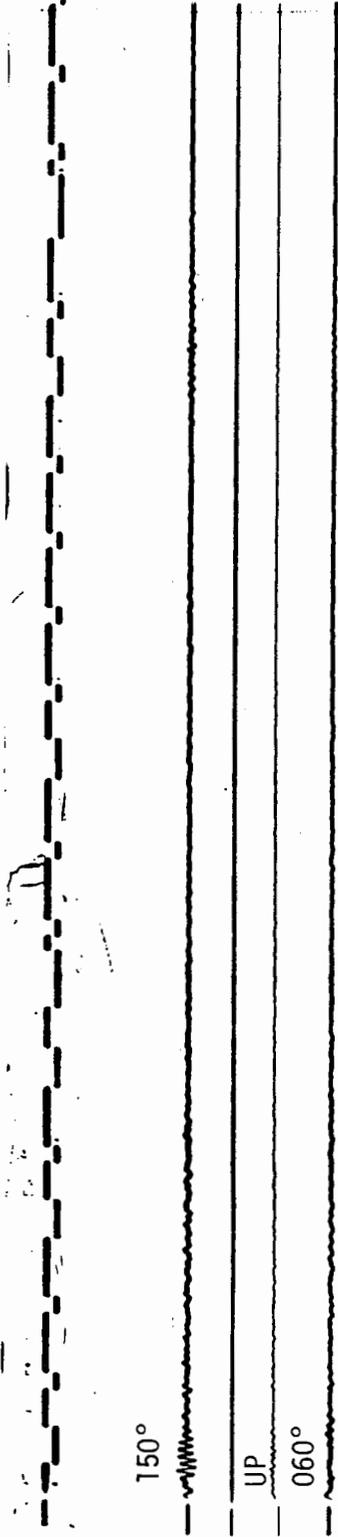
Record Evaluated By Date of This Sheet

Remarks:

Santa Barbara earthquake 13 August 1978

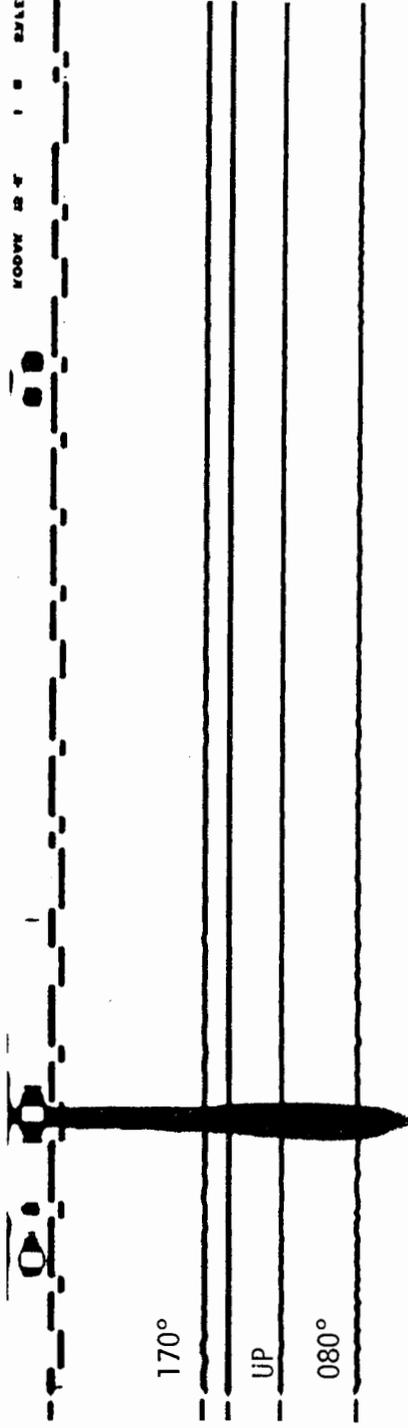
CDMG Station 295 Junca1 Dam B

SMA-1T Serial No. 2521 Center of Arch



SMA-1 Serial No. 1705 Crest (Gravity Section)

Time Scale (1 sec)

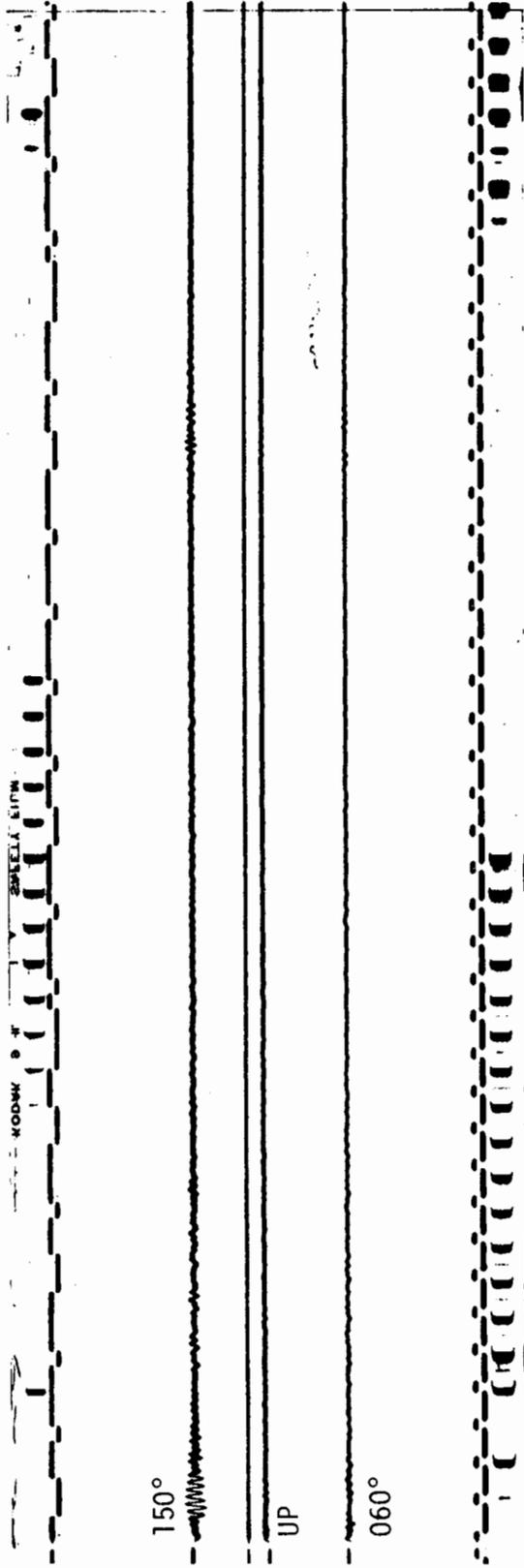


Time Scale (1 sec)

Santa Barbara earthquake 13 August 1978

CDMG Station 295 Junca1 Dam B

SMA-1 Serial No. 1719 Right Multi-arch Section



STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 Aug 1978 Time 22:54:52.4 (GMT)
 Region

Latitude 34.370 N (+ 2 km)
 Longitude 119.717 W (+ 2 km) Depth (km) 12.5 + 3 km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

Epicentral Range (km) 33.4 Azimuth (E)-(S) (deg) 314.4
 (deg) 0.30 (S)-(E) (deg) 134.2

Station Number CDMG none USGS 106 Owner U. S. Bureau of Reclamation
 Name Cachuma Dam
 Address County Santa Barbara

Latitude 34.59 N Type Earth Dam, 4-30 M Alluvium, then Siltstone
 Longitude 119.98 W Structure Size
 Installed 2 February 1954 Class
 Removed in place

Instrument Type(s) SMA-1
 Serial Number(s) 2153 (toe, valve house), 2159 (crest)
 Installed 22 April 1975 Removed in place

Record Installed n/a By Recovered n/a By
 CDMG File No.

Trace (from top)	Component	Orientation (deg)	Sensitivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual.	Serv Rec.
. 2153	Toe, Valve House									
.1	L 7181	340	1.81	.038	.61		.03			
.2	V 7165	UP	1.82	.038	.61		.02			
.3	T 7187	250	1.70	.037	.61		.07			
. 2159	Crest									
.1	L 6358	340	1.84	.038	.59		.08			
.2	V 7150	UP	1.70	.036	.61		.02			
.3	T 4395	250	1.95	.039	.59		.12			

Site information:

see references listed on the Santa Barbara Court House sheet (p. 10).

Time Code Quality Times: Trigger S-Wave Arrival
 S-Wave-Trigger 3 sec

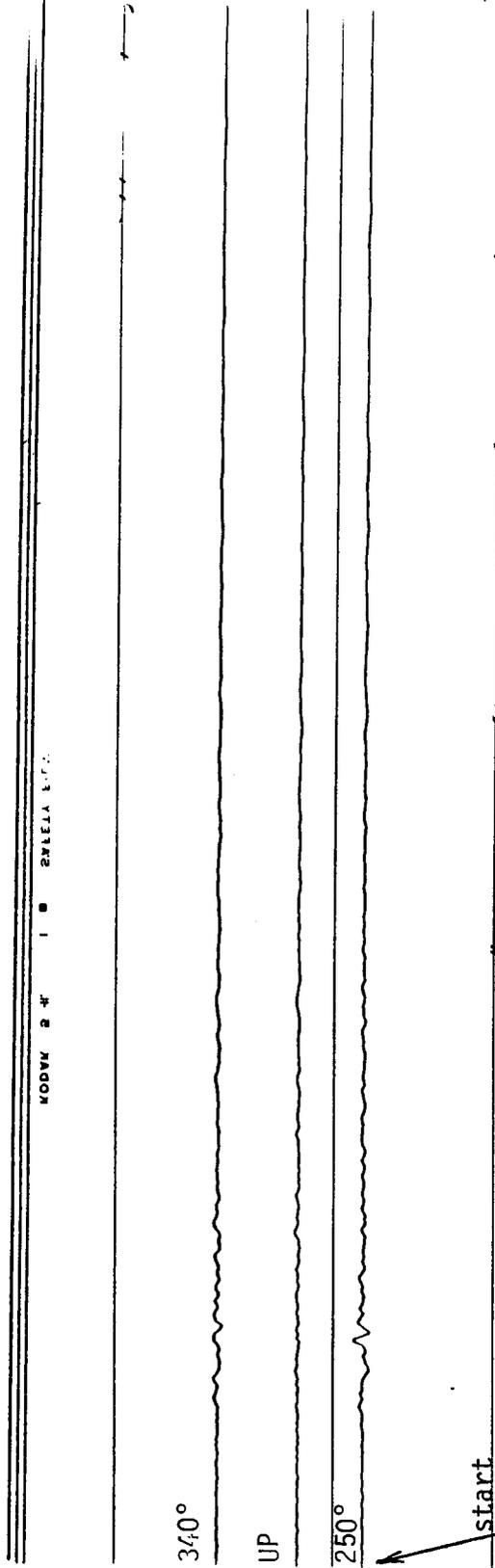
Record Evaluated By Date of This Sheet

Remarks: U. S. Bureau of Reclamation accelerogram supplied by Gerry Brady,
 U. S. Geological Survey Seismic Engineering Branch, Menlo Park, California.

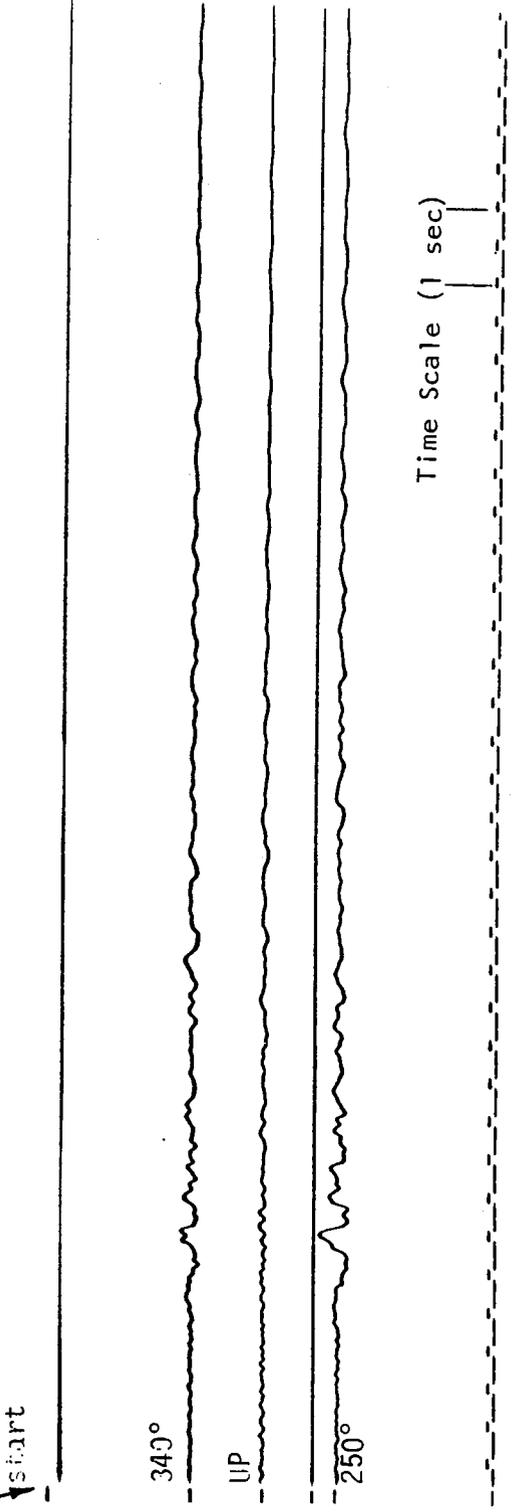
Santa Barbara earthquake 13 August 1978

USGS Station 106 Cachuma Dam

SMA-1 Serial No. 2153 Toe, Valve House



SMA-1 Serial No. 2159 Crest



U. S. Bureau of Reclamation accelerogram supplied by Gerry Brady,
U. S. Geological Survey, Seismic Engineering Branch, Menlo Park, California.

INSTRUMENTED BUILDING DESCRIPTION FORM

Building: Holiday Inn
(Name and address) 450 E. Harbor Blvd.
Ventura, CA

Coordinates: 34.276 °N 119.294 °W

Number of stories above/below ground: 12 / 0

Plan shape: Rectangular

Base dimensions: 147' 6" x 175' 8"

Typical floor plan dimensions: 61' 8" x 193' (levels 2 to 12)

Vertical load carrying system: 5" concrete slab; interior & exterior r.c. columns
(include floor decking system)

Lateral force resisting system: r.c. shear walls (end walls) in transverse
(include element locations) direction

Foundation type: 60' r.c. piles; grade beams; concrete slab

Unusual architectural features: None

Design date: 1970 Construction date: 1971

Design engineer: Kelly Pittelko Fritz and Forssen
(Name and address) Consulting Engineers
Los Angeles, CA (No current address available)

Architect: Vincent A. Decutis
(Name and address) 3742 Lamar Ave.
Memphis, Tenn.

Owner's Representative: Topeka Inn Management
(Name and address) 2209 W. 29th Street
Topeka, Kansas 66611

Remarks:

Santa Barbara earthquake 13 August 1978
 CDMG Station 339 Ventura Holiday Inn
 CRA-1 Serial No. 177, SMA-1 Serial No. 1699

STRONG-MOTION INSTRUMENTATION SCHEME

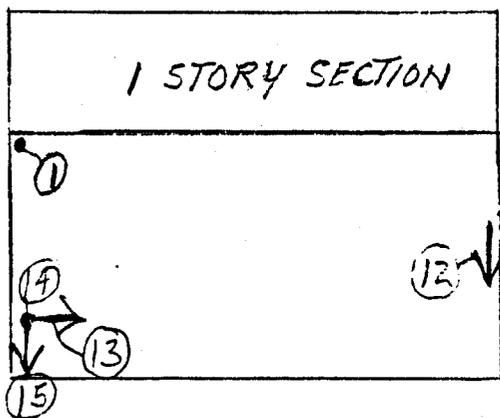
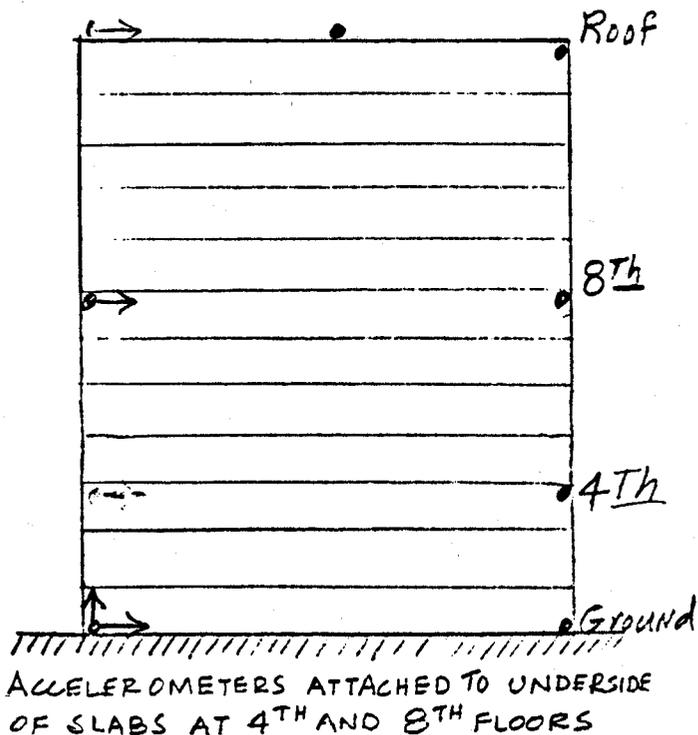
Ventura Holiday Inn, 450 East Harbor Blvd., Ventura, Calif.

Installation Notes and Recorder Trace Order:

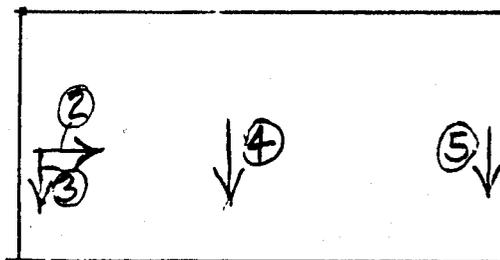
	Trace	Location
CRA-1	Accelerometer 1	Wall at ground floor level
	Fixed trace -	
	Accelerometer 2	Wall at roof level
	ditto 3	ditto
	Fixed trace -	
	Accelerometer 4	Elevated slab, roof
	ditto 5	Wall at roof level
	Fixed trace -	
	Accelerometer 6	Underside, 8th floor
	ditto 7	ditto
	Fixed trace -	
	Accelerometer 8	ditto
ditto 9	Underside, 4th floor	
Fixed trace -		
Accelerometer 10	ditto	
ditto 11	ditto	
Fixed trace -		
Accelerometer 12	Wall at ground floor level	
SMA-1	Accelerometer 13	
	ditto 14	Ground floor,
	ditto 15	telephone room

Horizontal starter to be located at roof level.

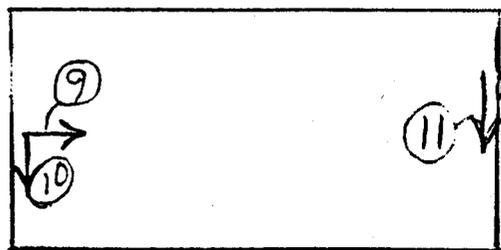
Installed 15 May 1978



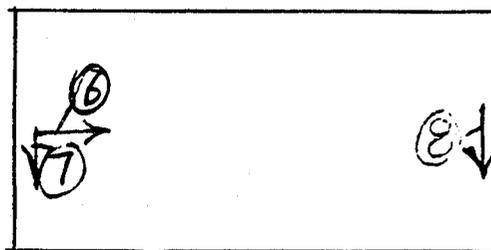
Ground Floor Plan



Roof Plan



4th Floor Plan

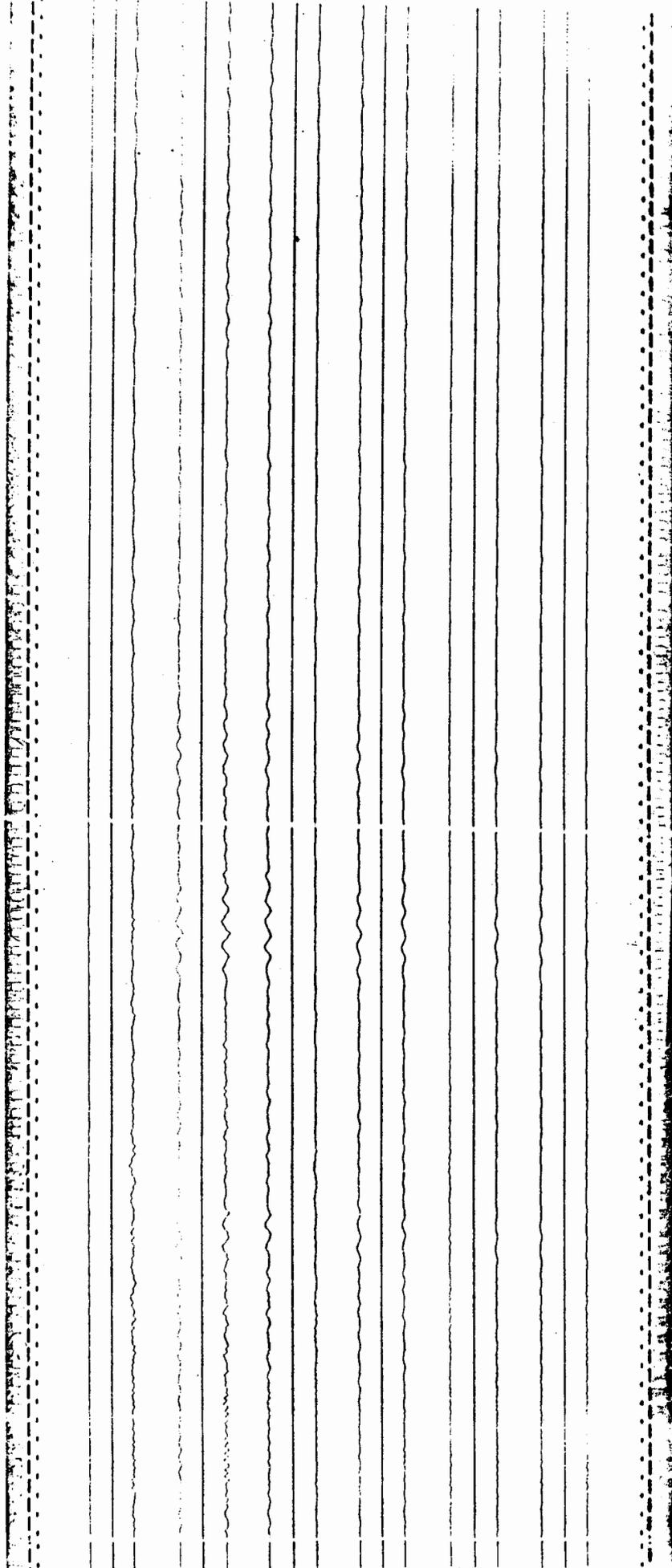


8th Floor Plan

Santa Barbara earthquake 13 August 1978

CDMG Station 339 Ventura Holiday Inn

CRA-1 Serial No. 177



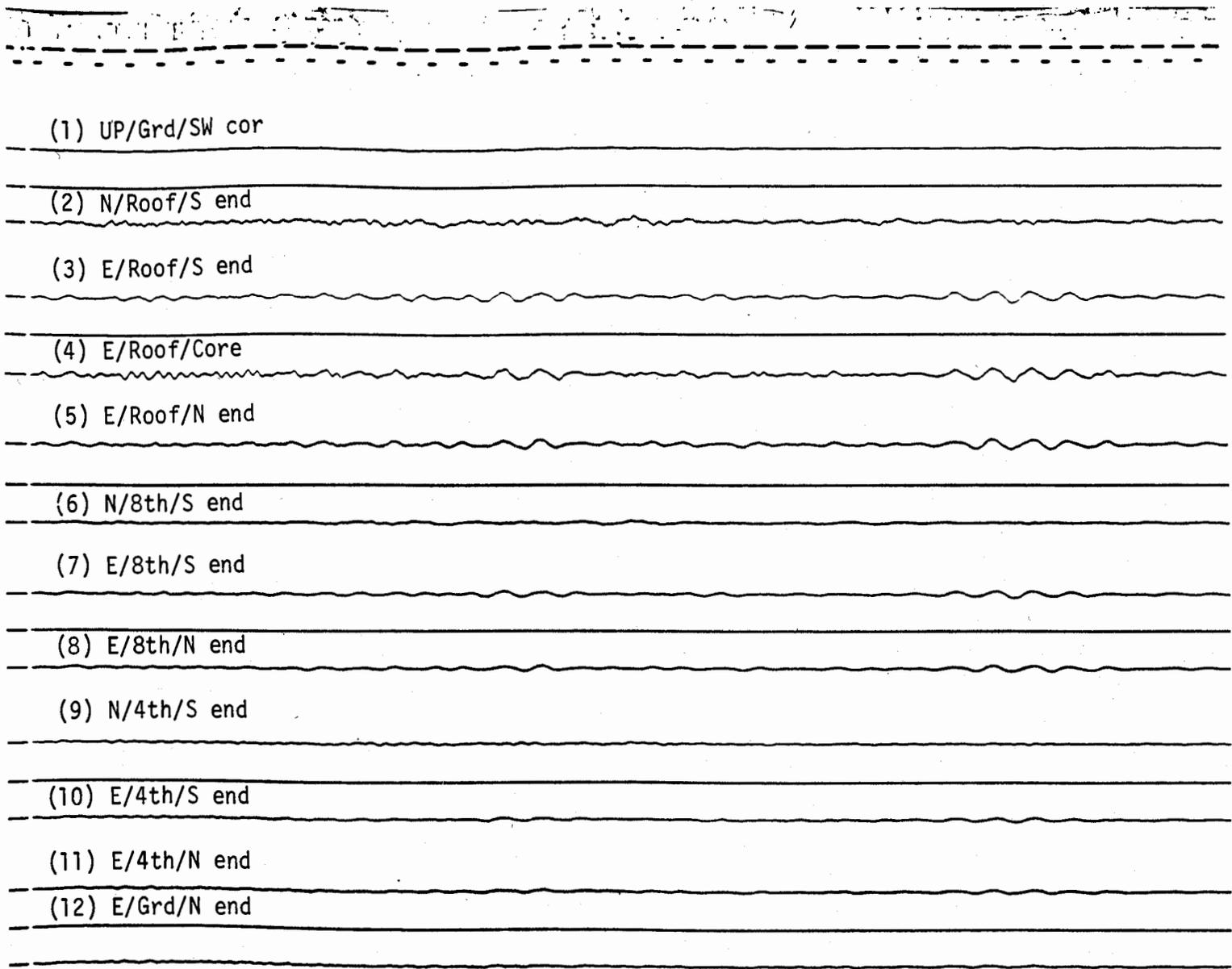
Time Scale (1 sec)

Reduced copy (two-thirds scale) of original accelerogram
See following page for full-scale section.

Santa Barbara earthquake 13 August 1978

CDMG Station 339 Ventura Holiday Inn

CRA-1 Serial No. 177



Time Scale (1 sec)

Santa Barbara earthquake 13 August 1978

CDMG Station 339 Ventura Holiday Inn

SMA-1 Serial No. 1699

NOV 8 0 1 0 2011 11:11 AM

(13) N/Grd/SE corner

(14) UP/Grd/SE corner

(15) E/Grd/SE corner

 Time Scale (1 sec)

CALIFORNIA STRONG MOTION INSTRUMENTATION PROGRAM

STRONG-MOTION RECORD - PRELIMINARY EVALUATION SHEET

Earthquake Date 13 August 1978 Time 22:54:52.4 ± 0.1
 Region Santa Barbara

Latitude 34.37 N (+ 2 km)
 Longitude 119.72 W (+ 2 km) Depth (km) 12.5 ± 3 km
 Magnitude $M_L = 5.1$ (PAS) Intensity (maximum)

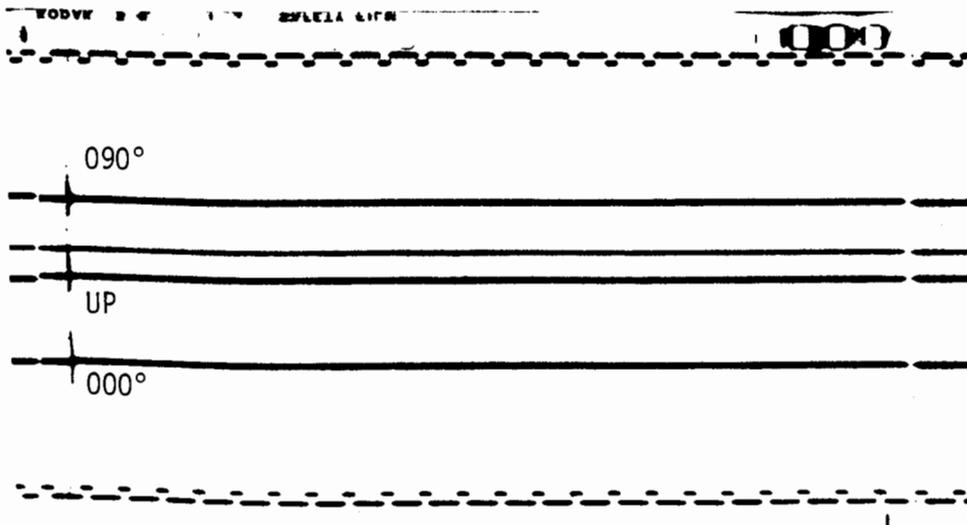
Epicentral Range (km) 48 Azimuth (E)-(S) (deg) 44
 (deg).43 (S)-(E) (deg) 224

Station Number CDMG 164 USGS 953 Owner CDMG
 Name Ozena
 Address Box 153, Star Route # 1 County Ventura
 Latitude 34.60° Type Freefield
 Longitude 119.35° Structure Size
 Installed 29 October 1974 Class
 Removed in place

Instrument Type(s) SMA-1
 Serial Number(s) 1716
 Installed 29 October 1974 Removed in place

Record Installed 20 Apr 1978 By MacGrady Recovered 18 Aug 1978 By MacGrady
 CDMG File No.

Trace (from top)	Component	Orientation (deg)	Sensitivity (mm/g)	Period (sec)	Crit. Damp.	Peak Ampl. (mm)	Accel. (g)	Duration Sig. Run (sec)	Trace Qual.	Serv Rec.
. 1	L	090	18.7	.038	.557	no recognizable waveform		11.45		
. 2	V	UP	19.3	.040	.557					
. 3	T	000	18.2	.038	.567					



Remarks:

Time Scale (1 sec)

COMPILATION OF STRONG-MOTION RECORDS RECOVERED FROM THE
SANTA BARBARA EARTHQUAKE OF 13 AUGUST 1978

Preliminary Report 22

1978